085

Response patterns of simulated corn yield and soil nitrous oxide emission to precipitation change

Precipitation plays an important role in crop production and soil greenhouse gas emissions. However, how crop yield and soil nitrous oxide (N_2O) emission respond to precipitation change, particularly with different background precipitations (dry, normal, and wet years), has not been well investigated. In this study, we examined the impacts of precipitation changes on corn yield and soil N_2O emission using a long-term (1981~2020, 40 years) climate dataset as well as seven manipulated precipitation treatments with different background precipitations using the DeNitrification-DeComposition (DNDC) model. Results showed large variations of corn yield and precipitation but small variation of soil N_2O emission among 40 years. Both corn yield and soil N_2O emission showed near linear relationships with precipitation based on the long-term precipitation data. Corn yield showed a positive linear response to precipitation manipulations in the dry year, but no response to increases in precipitation in the normal year, a trend of decrease in the wet year, but a sharp decrease in the extreme drought treatments. Soil N_2O emission mostly responded linearly to precipitation manipulations. Decreases in precipitation in the dry year reduced more soil N_2O emission than those in the normal and wet years, while increases in precipitation increased more soil N_2O emission in the normal and wet years than in the dry year. This study revealed different response patterns of corn yield and soil N_2O emission to precipitation and highlights that mitigation strategy for soil N_2O emission reduction should consider different background climate conditions. This project was supported by the NSF and USDA projects.